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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,688	11/04/2003	Henning Bulow	Q78112	4945
23373	7590	11/15/2006	EXAMINER	
SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			AZEMAR, GUERSSY	
			ART UNIT	PAPER NUMBER
			2613	

DATE MAILED: 11/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/699,688

Applicant(s)

BULOW, HENNING

Examiner

Guerssy Azemar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 11/04/2003.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 101***

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claim 10 is rejected under 35 U.S.C. 101 because the program for performing the steps of recovering an optical signal must be stored on a readable medium.

Therefore claim 10 is rejected because the claimed invention is directed to non-statutory subject matter.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1,2, 5, 6, 7, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prucnal (6,265,999) in view of Leight (6,404,535).

(1) With respect to claim 1:

As shown in figure 20, Prucnal teaches a digital signal-processing receiver for analyzing an optical signal, in particular in a terabit optical network, comprising a receiver input for receiving the optical signal (201 in figure 20), a photo diode (215 in figure 20), an analog-to-digital conversion unit (216 in figure 20), and a DSP processing unit (221 in figure 20),

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wherein that the DSP receiver comprises a splitting unit splitting the optical signal received by the receiver input (202 in figure 20) and feeding the split parts into at least two waveguide branches (203 in figure 20), that each waveguide branch is fed onto a separate photo diode (215 in figure 20), that the signal of each photo diode is fed into a separate ADC unit (216 in figure 20), and that the signal of each ADC unit is fed into the DSP processing unit (through 222 to 221 in figure 20).

However, Prucnal does not teach the two waveguide branches that at least one waveguide branch comprises an optical filtering element.

Leight teaches the two waveguide branches that at least one waveguide branch comprises an optical filtering element (30 or 32 in figure 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the filtering element taught by Leight in the receiver unit taught by Prucnal because the filtering element would reject certain undesirable frequencies in order to provide smoother and cleaner signals at the output.

(2) With respect to claim 2:

Prucnal teaches all of the subject matter as described above except for the DSP receiver, wherein each waveguide branch comprises a different optical filtering element.

However, Leight teaches the DSP receiver, wherein each waveguide branch comprises a different optical filtering element (both waveguides go into different filters 30 and 32 in figure 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the filtering element taught by Leight in the receiver unit taught

by Prucnal because the filtering element would reject certain undesirable frequencies in order to provide smoother and cleaner signals at the output.

(3) With respect to claim 5:

Prucnal teaches all of the subject matter as described above except for the DSP receiver, wherein an additional optical filtering element is arranged between the receiver input and the splitting unit.

However, Leight teaches the filtering element (30 and 32 in figure 1).

Although Leight teaches no additional filtering element between the receiver input and the splitting unit, a filter is usually recommended at a receiver input in order to compensate for the noise incurred during transmission from the transmitter. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to place on the filters taught by Leight between the receiver input and the splitting unit in the receiver taught Prucnal because, in doing so the input signal would be noise free.

(4) With respect to claims 6 and 10:

As shown in figure 20, Prucnal teaches a method for recovering an optical signals with a DSP receiver, wherein by the following steps:

- a) the optical signal is split into at least two branches (202 in figure 20);
- c) the split optical signals are detected (215 in figure 20) and converted into split digital signals (216 in figure 20);
- d) the split digital signals are analyzed in order to recover information of the optical signal (221 in figure 20).

However, Prucnal does not teach the step b) at least one split optical signal undergoes a filtering procedure;

Leight teaches the step b) at least one split optical signal undergoes a filtering procedure (30 and 32 in figure 1);

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the filtering element taught by Leight in the receiver unit taught by Prucnal because the filtering element would reject certain undesirable frequencies in order to provide smoother and cleaner signals at the output.

(5) With respect to claim 7:

Prucnal teaches the method wherein the information is a recovered electrical data signal modulated onto the optical signal (the output of 221 in figure 20, the process of o/e conversion, and a/d conversion, which ends in the output of a processor will render an electrical signal modulated onto optical signal).

5. Claims 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prucnal (6,265,999) and Leight (6,404,535) as applied to claim 6 above, and further in view of Easley et al. (6,259,482).

(1) With respect to claim 3:

Prucnal and Leight teach all of the subject matter as described above, except for the DSP receiver, wherein the optical filtering element(s) comprise chromatic dispersion elements and/or polarization filters and/or spectral filters.

However, Easley et al. teaches spectral filters (column 19, line 44).

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Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the spectral filters taught by Easley et al. in the optical receiver taught by Prucnal because it would remove the unwanted signal to provide cleaner signals.

(2) With respect to claim 4:

Prucnal and Leight teach all of the subject matter as described above, except for the DSP receiver, wherein the DSP processing unit comprises an application specific integrated circuit and/or a field programmable gate array circuit.

It is well known in the art that the integrated circuit offers the best alternative to bulky and expensive analog circuitry. The integrated circuit or the field programmable gate array circuit allow for a flexible device, which would welcome changes in features without hardware replacements. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the application specific integrated circuit and/or a field programmable gate array circuit filters in the optical receiver taught by Prucnal because it would, not only impact the cost of the device in a positive economical way, but also the device would be smaller and more versatile.

6. Claims 8, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prucnal (6,265,999) and Leight (6,404,535) as applied to claim 6 above, and further in view of Dinc et al. (20020184596).

(1) With respect to claim 8:

Prucnal and Leight teach all of the subject matter as described above, except for the method wherein the information is likelihood numbers for the probability of 0 and 1 bits carried by the optical signal.

Dinc et al. teaches the method wherein the information is likelihood numbers for the probability of 0 and 1 bits carried by the optical signal (first two lines in paragraph 0016 in page 2, the probability that the next bit of the information is either a 0 or 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the likelihood numbers as taught by Dinc et al. in the optical receiver taught by Prucnal because it provides computations without increased complexity.

(9) With respect to claim 9:

Prucnal and Leight teach all of the subject matter as described above, except for the method wherein the analysis of the split optical signals uses MAP algorithm.

Dinc et al. teaches the method wherein the analysis of the split optical signals uses MAP algorithm (page 2, paragraph 0016).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the MAP algorithm as taught by Dinc et al. in the optical receiver taught by Prucnal because it provides computations without increased complexity.

### **Conclusion**

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Guerssy Azemar whose telephone number is (571) 270-1076. The examiner can normally be reached on Mon-Fri (every other Fridays off).




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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Guerssy Azemar

11/09/2006

  
KENNETH VANDERPUYE  
SUPERVISORY PATENT EXAMINER

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